

Patent claims:

1. Radiation shielding arrangement for shielding neutron radiation and gamma radiation from particle accelerators, storage rings, target, experimental or analytical devices, comprising at least one shielding element made of a first material which contains bound water.
- 10 2. Radiation shielding arrangement according to claim 1, characterized in that the first material contains gypsum in the bound state in the chemical composition $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.
- 15 3. Radiation shielding arrangement according to claim 3, characterized in that the shielding element comprises a gypsum wall.
- 20 4. Radiation shielding arrangement according to claim 3, characterized in that the gypsum wall has a thickness which is matched to the radiation spectra of a high-energy particle accelerator and/or high-energy particle storage ring for electrons, positrons or ions.
- 25 5. Radiation shielding arrangement according to claim 3, characterized in that the gypsum wall has a thickness which is greater than or equal to the secondary radiation equilibrium thickness, in particular a thickness of at least 2 m, at least 5 m or at least 7 m.

6. Radiation shielding arrangement according to claim 1,
built in the form of a multilayer construction.
7. Radiation shielding arrangement according to claim 1,
built in the form of a modular construction.
8. Radiation shielding arrangement according to claim 1,
characterized by a loadbearing layer which is arranged
on a first side of the shielding element and has at
10 least a minimum thickness which is dimensioned such
that the radiation shielding arrangement, in
particular the arrangement of shielding element and
loadbearing layer, is self-supporting.
- 15 9. Radiation shielding arrangement according to claim 1,
characterized in that the loadbearing layer comprises
concrete formwork.
10. Radiation shielding arrangement according to claim 1,
20 characterized in that the shielding element is
provided with formwork on both sides, in particular of
concrete.
11. Radiation shielding arrangement according to claim 1,
25 characterized by a neutron absorber layer which
contains a neutron-absorbing material.
12. Radiation shielding arrangement according to claim 1,
characterized by a neutron absorber layer which
30 contains boron, cadmium and gadolinium.

13. Radiation shielding arrangement according to claim 1,
characterized by a neutron absorber layer which
contains boron-paraffin.

5 14. Radiation shielding arrangement according to claim 10,
characterized in that the neutron absorber layer is
arranged within the formwork or between the formwork
and the gypsum wall.

10 15. Radiation shielding arrangement according to claim 8,
characterized in that the loadbearing layer comprises
a neutron-absorbing material.

15 16. Radiation shielding arrangement, for shielding neutron
radiation and gamma radiation from particle
accelerators, storage rings, target, experimental or
analytical devices, comprising at least one spallation
layer comprising a material which is characterized in
that spallation reactions are triggered by means of
20 neutron irradiation.

17. Radiation shielding arrangement according to claim 16,
characterized in that said material is a metal.

25 18. Use of gypsum from flue gas desulphurization plants
for producing a radiation shielding arrangement for
shielding neutron radiation and gamma radiation from
high-energy particle accelerators, storage rings,
target, experimental or analytical devices.

30 19. Use of a shielding element which contains gypsum for
shielding radiation from a particle accelerator, a

particle storage ring, a target device, an experimental device or an analytical device.